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ABSTRACT

In the mid-1960s, as part of the "War on Poverty," the armed services accepted up to 100,000 personnel per year who would have been rejected had not standards for reading and mathematics abilities been lowered. Over 80 percent of these persons completed their tour of duty and more than 90 percent were rated above average in their service. An error in test norming in the late 1970s permitted the enlistment of almost 360,000 young men with aptitude test scores below the minimum standards of the time. These enlistees, on the whole, performed satisfactorily. The military used four strategies with the lower ability recruits: limited assignments, provision of extra help and time, revision of training courses, and establishment of special training units. The military provided functional context literacy training through FLIT: The Functional Literacy Program; FLING: Functional Literacy for the National Guard; and JORP: Job-Oriented Reading Program. Other functional context training efforts include electronics technician's training sponsored by the Ford Foundation, functional context education workshops, technology transfer in the job skills education program (JSEP), and the McGraw-Hill functional context basic skills project. The paper concludes with implications for human resources development policy and practice. Three figures, 2 data tables, and 25 references are included. (CML)

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41. FUNCTIONAL CONTEXT EDUCATION: POLICY AND TRAINING METHODS FROM THE MILITARY EXPERIENCE

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U.S. DEPARTMENT OF EDUCATION
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41. FUNCTIONAL CONTEXT EDUCATION: POLICY AND TRAINING METHODS FROM THE MILITARY EXPERIENCE

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Today there is widespread concern that the educational and intellectual quality of our nation's workforce does not meet the needs of the workplace. The Commission on Workforce Quality and Labor Market Efficiency identified two groups of individuals whose education and skills may render them suitable for only the lowest skilled and paying jobs.

> "The first group consists of those who leave the education system, mostly as dropouts, without acquiring basic language and mathematics skills. Having very limited labor market opportunities, these individuals are likely to find their way into the welfare system or the underground economy. The second group has no marketable job skills beyond basic language and mathematics. They have limited labor market opportunities unless they receive additional training through schools, employers, or government training programs. This group includes young workers, just out of school, as well as experienced workers whose skills may have become obsolete" (Department of Labor, 1989, pp. 1-2).

Focus on "Second Chance" Education

The Commission on Workforce and Labor Market Efficiency has a special interest in "second chance" education and training systems that might be useful to those youth and adults in the two groups described above. They have left the elementary and secondary schools without having attained high levels of ability in skills such as reading and mathematics. It is important to understand how they fare in the world of work, and what kinds of education and training opportunities can best serve their needs.

The Military Experience

In the last twenty-five years there have been two times when the military services of the United States have had to utilize youth whose abilities fit the descriptions of the groups identified above. During the mid-1960s the Department of Defense, as a matter of policy, lowered its standards for entrance on the Armed Forces Qualification Test. From 1966 through 1971, over 300,000 young adults were enlisted who would have been rejected for low literacy and mathematics abilities.

The second time the military had to utilize lower aptitude young adults was during the period from 1976 through 1980. During this period, a mistake in the calibration of the Armed Services Vocational Aptitude Battery resulted in the accession of over 350,000 people whose aptitude scores would have rendered them ineligible for service if the proper norms had been used. Across the four services in fiscal year 1979, whereas it was thought that there was only five percent of

enlistees in the lowest category of aptitude permitted to enlist, there was actually thirty percent.

Studies of "Cast-off Youth". Though the armed services have been the largest "employer" of young adults with lower levels of basic skills, most manpower policy has been made without the insights from the military's experience with youth cast off from school and work. Thus, up until recently, conclusions were drawn about the capabilities of lower aptitude, less literate young people without benefit of the findings from numerous military studies of the training, job performance, and general acceptability of lower ability youth.

To remedy this situation, in 1983 the Ford Foundation sponsored research to analyze the military's use of lower aptitude youth (Sticht, Armstrong, Hickey, & Caylor, 1987). More recently, the National Commission on Testing and Public Policy, also sponsored by the Ford Foundation, supported the preparation of additional analyses of the military's utilization of less literate, lower aptitude enlistees (Sticht, 1989).

Purpose of the Present Paper

The present paper provides a synthesis of the foregoing works. It presents an overview of the military's experience with personnel whose aptitude scores are within the range from the 10th to the 30th percentiles on the Armed Forces Qualification Test (AFQT). This makes-up the group referred to as category IVs by military manpower management. Individuals in category IV on the AFQT are considered to be "below average" in trainability. Their scores are roughly comparable to

intelligence scores within the range from 70 to 91, which is two-thirds to two standard deviations below the average intelligence quotient (IQ) of 100.

Individuals in category V, in the percentile range from 0 to 9, with an intelligence score range below 69, are considered to be "well below average" in trainability, and are prohibited from enlistment by law (Sticht, et al., 1987, pp. 21-24).

This paper has four parts:

Part 1, The Military Performance of Lower Ability Youth, summarizes the record of performance of category IV personnel in the mid-1960s, when they were admitted by policy, and again in the late 1970s when they were admitted by mistake. The major question here is, how well did these people perform in training and on the job?

Part 2, Accommodating Lower Ability Youth, summarizes strategies that the military uses to cope with the demands on the training and education system caused by lower ability, young adults. Attention is given to the role of the military as a "motivating context" that might account for much of the success of these "at risk" young adults.

Part 3, Functional Context Education, summarizes a line of research and development conducted to develop better methods of training and educating lower ability personnel. Examples of the transfer of principles and methods of what has been called "**functional context education**" (Sticht, et al., 1987; Sticht, 1987) from military contexts to civilian settings are given.

Part 4, Implications for Human Resources Development, discusses suggestions for policy and practice resulting from the results of the military experience with lower ability, "at risk" young adults.

The Military Performance of Lower Ability Youth

This section summarizes the performance of lower ability personnel in the mid-1960s and during the misnorming period from 1976 through 1980.

Project 100,000

During the mid-1960s, as a part of President Johnson's "War on Poverty," Secretary of Defense Robert S. McNamara initiated Project 100,000. In this program, the services lowered their standards on the Armed Forces Qualification Test, which measures reading and mathematics abilities, and accepted up to 100,000 personnel per year who would have been rejected under earlier standards.

To determine how well the Project 100,000 personnel performed, an extensive data collection procedure was established. Detailed records were kept on how well the Project 100,000 personnel performed in training and on the job. Additionally, records were maintained for a "control" or comparison group made-up of non-Project 100,000 personnel. The latter included personnel in categories I (well above average in trainability, percentiles 93-100), II (above average, percentiles 65-92), and III (average, percentiles 31-64), in addition to some category IV personnel who were admitted under the old standards because they had scores on supplemental tests that qualified them for service.

Demographics. As a group, the Project 100,000 men (no women were included) had the demographic characteristics of the "culture of poverty." Over half had been without a job or had been working for under $60 per week, a level consistent with poverty levels of the time (1966-1971). About ten percent had one or two civil court convictions. Less than half (46.9%) were high school graduates, and their median reading level was at the sixth grade. Thirty-six percent were black, and almost half the group, particularly the blacks, came from the southern states.

Performance. Figure 1 summarizes the training and job performance of Project 100,000 personnel in relation to a control group of average and above average aptitude personnel in the Army. It should be noted that about two-thirds of the Project 100,000 personnel entered the Army, which is traditionally the recipient of greater numbers of low-aptitude personnel during a general mobilization.

Figure 1 shows that 94 percent of Project 100,000 personnel completed basic military training, and 94 percent required no recycles (repetition of one or more weeks of training). This compares to 98 percent for controls.

In job technical skills training, 86 percent completed training, and 92 percent required no recycles. Again, this compares favorably to the rates for controls.

A major indicator of military usefulness is completion of the tour of duty or its converse, attrition. Overall, 84 percent of Project 100,000 and 92 percent of control personnel completed 13 to 24 months of

service, which is the period reported by Department of Defense records on Project 100,000.

Over ninety percent of both Project 100,000 and controls had **supervisor's ratings** in the "above average" range, suggesting that the overall performance of Project 100,000 men was acceptable to supervisors. A special study in the Air Force showed that category I men were rated at an average of 7.97 on a nine point scale, while the lowest group of category IV men were rated at 7.04, less than one score difference between the highest and the lowest aptitude groups on the scale (Sticht, 1989, p. 35).

The final indicator of performance, **paygrade achieved**, shows that Project 100,000 personnel did not make rank as rapidly as non-Project 100,000 personnel. At the end of 19 to 24 months of service, only 67 percent of Project 100,000 achieved a paygrade of E-4 (lowest supervisor's rank), contrasted to 82 percent of higher ability personnel.

Summary of Project 100,000. Overall, the Project 100,000 personnel did not perform as well as average or higher ability personnel. On the other hand, it should be noted that over 80 percent completed their tour of duty and more than 90 percent were rated above average in their service. This from a group that had been totally cast off from military service because it was said that they were too limited in basic reading and mathematics skills to be "trainable."

The ASVAB Misnorming

From January 1976 through September 1980 the tables for converting raw scores on the Armed Forces Qualification Test of the Armed Services Vocational Aptitude Battery (ASVAB) were in error. This permitted the enlistment of almost 360,000 young men with aptitude test scores below the minimum standards of the time (Eitelberg, 1988, pp. 73-74).

When the mistake was discovered, studies were conducted to find out how well the "potentially ineligibles- PIs" as they were called - had performed. Table 1 shows data from Greenberg (1980) for Army PIs (the Army received over 200,000 of the PIs). The table compares the performance of the PIs on six different indicators of performance to personnel fully eligible (non-PIs) at the other aptitude categories of the AFQT.

The table indicates that the PIs very much resembled average aptitude, qualified troops (mental categories IIIA and IIIB) on first term attrition, achievement of paygrade E4, and attrition in skill training (job technical training).

On the Skill Qualification Tests (SQT) the PIs performed more poorly. This is a consistent finding: lower ability personnel perform more poorly when tested on paper-and-pencil and hands-on tests than do higher ability troops. However, the SQT performance of the PIs in this case did not differ too much from the performance of qualified category IIIB personnel. Furthermore, in terms of first term retention, that is, those who were reenlisted for a second term, the PIs tended to be

acceptable and to reenlist at a higher rate than the other aptitude categories.

Other studies of Navy PIs indicated that they had an attrition rate in the first tour about 10 percent higher than average ability sailors and they achieved paygrade E4 at a lower rate than average (42 percent versus 44-46 for IIIBs and IIIAs) (Cory & Booth-Kewly (1986)).

Work by Ramsberger & Means (1987), summarized in Sticht (1989) compared PIs to personnel qualified in the category just above that of the PIs in relation to completing 36 months of service, paygrade achieved, and eligibility for reenlistment. They looked at these relationships in low and high complexity jobs across the Army, Navy and Air Force. Over all, there were no consistent effects of job complexity on the differences between PIs and controls. In seven of the 18 comparisons of PIs and controls the PIs performed as well as or better than the controls. In seven comparisons, the controls surpassed the PIs by only one to four percentage points. The four cases in which the control and PI differences exceeded 10 percent were all in the Air force, and concerned the completion of the first term and eligibility for reenlistment.

In summarizing the studies of PIs as of 1987, the Department of Defense's Director of Accession Policy stated that "...a quarter-of-a-million people who did not meet the enlistment standards and should not have been able to do the job did in fact do it pretty well" (Sellman, 1987, p. 420).

Discussion

Project 100,000 was a publicly announced program to involve the military in a social welfare program, Johnson's War on Poverty. As such, it was highly criticized as an unwelcome intrusion into the manpower management of the military, and it was widely expected that the program would fail. The Army Times editorialized: "Are the services likely to get any reasonable mileage from such people? Past performance indicates not...Is this any time to require the services to take on a large scale "poverty-war" training mission? We would think not. The services more than have their hands full with the fighting war" (Sticht, et al., 1987, p. 15).

Two decades later, the Navy Times of February 25, 1985 referred to Project 100,000 as "...the infamous effort of a generation ago..." and goes on to state that the Chief of Naval Operations wanted to do something in the Navy to help improve the sorry state of education of many enlistees. While the CNO did not know precisely what he wanted to do, he knew what he did not want...he did not want another Project 100,000 which "...is almost universally remembered by military people as a disaster that caused the military services tremendous grief."

This comment was made in the Navy Times in 1985 even though, unbeknownst to everyone, the services had had "another Project 100,000" in the misnorming episode. But in this case there was no loud hue and cry. And, even when the incident had been discovered, and the analyses of performance summarized above completed, the Director of Accession

Policy concluded that the Potentially Ineligibles had, on the whole, performed satisfactorily.

Given the latter findings, and the data that showed that, contrary to expectations, the Project 100,000 people performed satisfactorily as a group, it might have been expected that the policy of excluding hundreds of thousands of young adults from military service might have been reversed. But it was not. Instead, standards were immediately raised, and a request for more millions of dollars to recruit higher quality personnel was made by the military and accepted by the Congress.

An implication of the military's experience with lower aptitude personnel in these two time periods is that similar attitudes may be held by civilian organizations. If we declare large numbers of the citizenry "functionally illiterate," we may cause needless abandonment of many youth and adults, and the proliferation of programs of "second chance" and "remedial" education that are not genuinely needed. The assignment to such programs of millions of youth and adults might undermine their self concepts, and contribute to a reduction in their motivation to seek work, and to pursue programs of education and training that contribute to genuine needs. This may account, in part, for the fact that many eligible adults do not pursue adult literacy education, and over half of those that do quit before completing their objectives (Sticht, 1988).

Accommodating Lower Ability Youth

The military has four strategies that it has used to cope with the strain on the training and education system that is caused by the

mobilization of large numbers of lower ability recruits. The choice of which of these four strategies will be used most often roughly follows a "principle of least effort." That is, the less investment in money, time, human and material resources a strategy requires, the more likely it is to be used.

Ordered from least to most difficult to implement, the four strategies are:

(1) **limited assignments**, in which lower ability recruits are assigned to less cognitively demanding jobs with their less demanding training requirements;

(2) **provision of extra help and time**, in which instructors or buddies coach or otherwise help the person learn something; extra study time is offered in the evenings; or students are set-back or "recycled" one or more weeks;

(3) **revision of training courses**, in which parts of or entire courses may be revised with respect to content or methods to make difficult segments of instruction or entire courses more learnable; and

(4) **establishment of special training units**, in which personnel are removed from their regular unit and sent to remedial literacy training.

Payoff of Each Strategy

Project 100,000 made use of each of these four strategies to accommodate the hundreds of thousands of lower ability recruits. Although it is not possible to know for certain how much each strategy contributed to the success of the program, it is possible to make an estimate.

Data for Project 100,000 show that 86 percent of the Project 100,000 men were assigned to just four of the nine Defense Department occupational areas, with the largest number (36 percent) going to occupational area 0: Infantry, Gun Crews, Seamen, all combat-oriented jobs typically rated less cognitively demanding. This suggests that a large amount of the Project 100,000 success was attributable to the strategy of limited assignments.

The recycling strategy had less impact, with only 6 percent of the Project 100,000 recruits being recycled in basic training and 8 percent in job technical skills training (Figure 1).

Regarding course revisions, Greenberg (1969), the Director of Project 100,000, reported revisions in some 50 courses by 1969, with most changes leading to simplification of materials, deletion of theoretical, abstract content, and an increase in hands-on instruction.

Some 50,000, or about 15 percent of the Project 100,000 recruits who completed their tour of duty were assigned to special training units for remedial literacy.

By this accounting, because the strategy of limited assignment was the only one that directly affected most of the Project 100,000 personnel, it is probably the strategy that contributed most to the success of Project 100,000. Extra help and time, and course revisions, in that order, follow limited assignments in the amount of impact on Project 100,000. Remedial literacy training may have helped a little, but evaluations of the effects of literacy training revealed only

minimal, if any impact on the performance of the Project 100,000 personnel (Fisher, 1971).

The Misnorming Incident. No data have been found that analyze the occupational assignments, recycle rates, and remedial training of the PIs. One study sorted PIs and eligibles by high, medium, and low demanding jobs, and found that the largest number of both PIs and eligibles were in lower demanding jobs (Means, Nigam, & Heisey, 1985). There were no differences, however, between the numbers of PIs and eligibles in the three categories.

The Military as a Motivating Context. To an unknown degree, the success of lower ability personnel in the military may reflect the fact that military service motivates such success because it is a legally binding contract with serious penalties for failure to perform; it is recognized and socially approved service; and it provides the service member with a large amount of social capital (peer recognition; group morale and cohesion; family and community support; and so forth) (Coleman & Hoffer, 1987) within both military and civilian contexts.

The influence of the military context may account for why over four out of five Project 100,000 recruits had completed an average of 18 months of service (figure 1) at the time the data were collected, while only about one in five Job Corps participants, who have backgrounds similar to the Project 100,000 men, remain in the program for a year or more (Levitan & Gallo, 1988, p. 134).

While only skimpy data are available, follow-up studies of Project 100,000 veterans indicate that they had completed additional schooling

and they were earning slightly more than a non-veteran comparison group. Further, for some 8200 Project 100,000 men who stayed in the military for a career, their average AFQT scores were higher than at entry, and they had completed more years of education.

These data suggest that both in and out of the military, many lower aptitude men who had been "cast off" from society performed satisfactorily and became productive members of society.

Functional Context Education

Before, during, and after Project 100,000, military human resources research laboratories conducted research to develop training and education methods and programs that would be especially useful for lower ability personnel. One line of research in both technical training and education was conducted under a more or less loosely conceived concept called "functional" training.

Within the sphere of technical training, the concept was dubbed the "functional context method" by Shoemaker (1960). Within the sphere of education, the focus was on literacy programs, and during World War II the approach was called "functional" literacy training (Goldberg, 1951).

Many years before the World War II functional literacy programs and the postwar technical training studies, principles similar to those later called "functional context education" appeared in almost modern terms in a book by Fox, Bish, and Fuffner (cited in Johnson, 1951). Briefly, these principles included relating new instruction to old; making curriculum sensible by justifying topics and applying theory; focusing on purpose by providing immediate and explicit objectives;

assisting learning by creating a hands-on environment; supporting topics only as needed and (where appropriate) using actual equipment; limiting memorization by associating topics with practical applications, and organizing units of study into meaningful subunits organized around a whole.

To be "functional," therefore, instruction should build new knowledge on old knowledge; the instruction should be meaningful in terms of the learner's knowing both what is to be learned and why; and learning should be facilitated by limiting rote memorization and, instead, relying on understanding by presenting a "whole-to-part" organization of learning units, rendered more rememberable through practical applications.

Functional Context Technical Training

From the 1950s into the early 1970s, several research studies were conducted by the Army and Navy that attempted to apply the foregoing concepts to military technical training. These studies are summarized in Table 2.

In all of the courses, achievement was improved over that of "conventional" courses. Where measures were appropriate, both attrition (dropouts) and training time were significantly reduced.

As a part of Project REPAIR, Harry Shoemaker (1960) articulated the case against the traditional approach to teaching electronics maintenance, criticisms that hold for many electronics technicians courses today (Sticht, et al., 1987, chapter 10). The points Shoemaker made include:

1. The conventional approach fails to provide the learner with a meaningful and relevant context for learning novel and abstract material.

2. The abstract, unfamiliar material of basic electronics is unstimulating when taught out of context.

3. The conventional sequence forces the learner somehow to retain the knowledge of basic electronics until that knowledge is applied later in the course.

4. The "part-to-whole" sequence of the conventional approach directly conflicts with the "whole-to-part" sequence of trouble shooting, and this conflict may hinder the learning of troubleshooting skills.

In the "part-to-whole" approach that Shoemaker criticizes, students first learn about electricity as atoms, electrons, etc., and they study resistors, condensers, and so forth as "parts." Later, when actually working on real equipment, they start with the "whole" equipment and then figure out which "parts" are malfunctioning. The "part-to-whole" approach proceeds in the opposite manner from the way an electronics technician actually works, and, as their research showed, that approach does not result in technicians who are as good as those trained using the intact equipment first and then decomposing it systematically into parts.

Shoemaker's (1960) outline of the main features of the functional context method, as he called it, are reproduced verbatim.

"1. A meaningful and relevant context is provided for the learning of novel and abstract material. This is believed to be particularly beneficial in the learning of basic electronics principles which are taught within the contexts of equipment function and maintenance.

2. The use of relevant and functional contexts for instruction lessens the need for analogies and other materials of questionable relevance used in the conventional sequence to bridge the gap between novel material and the student's past experience.

3. The "whole-to-part" sequence of topics makes possible a close integration of basic electronics with troubleshooting, increasing its utility for the repairman.

4. The possession by the learner of relevant and meaningful functional context encourages questioning and problem-solving attitudes, which enhance motivation for the learning of new material. Knowing the function of a circuit stimulates one about the way the function is accomplished.

5. The method contains safeguards against inclusion of topics that lack functional significance. The relevance of a topic is readily judged when it is viewed in relation to established functional contexts. For example, knowledge of the internal functioning of detailed electronics parts such as resistors and capacitors can be regarded as superfluous when it is realized that such knowledge plays little if any role in troubleshooting and repair.

6. The use of troubleshooting-oriented contexts for instruction makes it possible to represent the job situation realistically in

training in terms of duties, types of maintenance problems, and equipment items encountered."

The "functional context method" that Shoemaker developed over thirty years ago is elaborated here because of (1) its relevance to training lower ability learners in technical areas, and (2) it predates and undergirds the considerable body of literature that is emerging under the banner of contemporary cognitive science, including artificial intelligence. For instance, concepts of "situated learning,"and "cognitive apprenticeship" present arguments for the importance of learning within the "functional context" to which the learning is to be applied (Gott, 1988, p.163). This is necessary, it is argued, because "Classroom tasks...can completely fail to provide the contextual features that allow authentic activity" (Brown, Collins, & Duguid, 1989).

Though much of the contemporary work in cognitive science is consistent with the work on the functional context method in the military human resources laboratories during the 1950s, 1960s, and early 1970s, it is often expressed in terms that do not communicate well to "common people." In the military research, a project to improve training in the Army's Radio Operator's School was accomplished following the "principle of functional context." The researchers provide a very down-to-earth explanation of this principle:

> "This principle is a general method of sequencing training content so that the intended use of new instructional material is established for the student

prior to the introduction of new material itself. The principle follows from the fact that a trainee can learn and retain best those new things that he can tie in with something he already knows. Ancillary to the principle of functional context are certain working rules: Go from the concrete to the abstract; go from the specific to the general; go from practice to theory; go from the familiar to unfamiliar. The nature of the objective to be attained will determine which formulation is chosen."

"...Many courses that are not organized this way are successful, because many trainees bring contexts with them that are already adequate, although not always the most appropriate for the material to be learned. As material becomes more novel, such fortuitous contexts rapidly become inadequate for the material, and an effort must be made to provide more adequate contexts" (Goffard, Polden, & Ward, 1970, p. 5).

Through the application of the functional context principle to the Radio Operator's course, the recycle rate for trainees was reduced by 30 percent in comparison with the standard course, and attrition was reduced by about 50 percent. These outcomes were achieved even though the functional context classes were 40 percent larger and contained twice as many Category IV personnel as the standard course.

Functional Context Literacy Training

Planners for Project 100,000 had anticipated that the lower ability personnel might require remedial literacy training. For this reason they recommended that requirements for literacy training be delineated and that educators "...integrate needed literacy training into the [job] skill training or during off-duty hours" (Sticht, et al., 1987, p. 88).

This recommendation led the military services to develop special training units for remedial literacy training similar to those Special Training Units that had been developed for training "functional literacy" in World War II. However, unlike the case during World War II, in which reading, writing, and arithmetic were taught within the context of military life, using the famous Private Pete and Sailor Sam series, the literacy programs put in place during the mid-1960s were "decontextualized" from military life. Instead, they were based on academically-oriented materials to permit progress through the grade levels toward a high school equivalency degree, the General Education Development (GED certificate).

FLIT: The Functional Literacy Program. Though the operational literacy programs put into place immediately upon the initiation of Project 100,000 in 1966 were "academic" and not "functional" in nature, research and development projects were initiated that eventually resulted in changing Army remedial literacy programs into functional, job-related programs (see Sticht, et al., 1987, Chapter 9 for an extended discussion of the World War II and other functional literacy programs discussed here).

The Army's Functional Literacy program was oriented in the direction recommended by the Project 100,000 planning group. That group had recommended that literacy and job technical skills training be integrated. The FLIT program accomplished this integration, at least to a large degree, though not completely, by using the reading materials found in Army job training and on the job to teach reading.

In research to study the reading demands of several Army career fields, it was found that most reading could be described as either reading-to-do something, such as locate information using tables of contents, indexes, or the bodies of manuals, or reading-to-learn something, such as studying course materials to take the end of week examination.

In the FLIT curriculum, materials were developed for Cooks, Combatants, Automotive Mechanics, Medical Corpsmen, Clerks, and Communications Specialists. The materials taught reading-to-do and reading-to-learn skills using these job-related materials. Thus, in addition to acquiring needed information processing skills students acquired knowledge needed to read and comprehend their job materials.

For the most part, the FLIT program was offered in the special training units that had been established at the outset of Project 100,000. However, special studies were carried out in which the job-oriented training was offered at the technical training school In one research project, the job-related literacy training was offered in after duty hours, as the Project 100,000 management group had recommended. This was called the FLIT Extended Day project.

A second project incorporated the job-oriented literacy training into the training day itself, thus actually integrating literacy and job skills training as the Project 100,000 management group had recommended. However, by the time this research was conducted, in the early to mid-1970s, Project 100,000 was over, the draft had been abolished, and the All-Volunteer Force was underway.

Operationalizing FLIT. With the advent of the All-Volunteer Force, there was concern that many volunteer recruits would require basic skills training. The Army thus disseminated the FLIT program to Army training centers at Forts Ord, Knox, Jackson, Polk, Leonard Wood, and Dix. The name was changed to Advanced Individual Preparatory Training (AITPT) and offered as a three to six week add-on to the beginning of Advanced Individual Training, as job skills technical training was called.

FLING and JORP. In the mid-1970s, Army National Guard officials sponsored the development of FLING: Functional Literacy for the National Guard based on the FLIT job-related basic skills training approach. During this same time period, the Air Force sponsored JORP: Job-Oriented Reading Program that was also based on the FLIT approach.

Figure 3 shows pre- and post-test scores on general reading and job-related reading task tests developed using the FLIT approach. Data are presented for the six Army sites where FLIT/AITPT was implemented; for the FLIT experimental Extended and Integrated Training Day programs; and for FLING and JORP.

Additionally, at the top of the figure, data are presented for a No Literacy Training group, consisting of Army Automotive Mechanics who were tested on both general and job-related reading before and after attending mechanics (not literacy) technical training. These data show that simply attending technical training may make significant improvements in both general and job-related reading.

Data from two general literacy programs that did not offer job-related literacy training are given, for the Air Force and the Army. The Air Force program was 13 weeks in duration, in contrast to the three to six week Army program. The data for these general literacy programs show that they did not make much improvement in job-related reading, which was the goal of the military's literacy training programs.

Overall, the data of Figure 3 confirms that students in job-related reading programs made more growth in job-related reading than in general reading ability. However, they made as much gain in general reading as did those in the general reading courses (for Army personnel). This is of interest because it demonstrates that job-oriented literacy training pays off in making people more competent with job materials, while it also generalizes to more generally available materials, too.

"Spin-off" From FLIT. Figure 2 shows a number of military literacy projects that resulted from the FLIT work. The already mentioned Air Force JORP project led to a large-scale Air Force project that was originally planned to address the basic skills requirements of Air Force technical fields in the same manner as the JORP and FLIT projects, with attention to reading and arithmetic requirements of work. However, when

it was recognized that most Air Force personnel do not lack rudimentary literacy and mathematics skills, the project was rapidly transformed into the search for methodologies for analyzing the knowledge and skills needed to be an expert technician in high technology fields (Gott, 1986).

From 1978 into 1989 the Army has pursued extensive work to analyze the basic skills of over 100 jobs, and to develop an extensive (over 400 hours) computer-based instructional system called the Job Skills Education Program (JSEP - "jay-sep") (Branson, in press). This project resulted from a briefing given in 1978 by Sticht to the then Assistant Secretary of the Army for Manpower, and a subsequent memorandum drafted by Sticht and redrafted and distributed by Dr. Sue Dueitt, Deputy Assistant Secretary of the Army for Human Systems and Resources.

From 1976 through 1985, the Navy developed and implemented the Job-Oriented Basic Skills (JOBS) program based on the FLIT approach. The JOBS program development concept was initiated by personnel at the Navy Personnel Research and Development Center in San Diego, and was facilitated by a 1977 meeting of Sticht with the Chief of Navy Personnel to provide a briefing on job-related literacy.

From 1983 through 1986, the Navy redesigned its on-duty reading and mathematics programs to change them from general to job-oriented programs. This work was accomplished by Sticht et al. (1986).

Technology Transfer from Military to Civilian Contexts

The "spin-off" from the FLIT project includes not only the military programs identified in Figure 2, but also projects to transfer the

military's technological developments in both functional context literacy and technical training to civilian contexts. Four projects are discussed that demonstrate the roles of individuals, government offices, and private organizations in bringing about this transfer.

Functional Context/Electronics Technician's Training. In 1983 the Ford Foundation sponsored a research and development project to demonstrate how the functional context technical and literacy training methods developed in the Army could be applied in civilian contexts (Sticht, et al., 1987).

In this work, a new approach to electronics technicians training was developed that integrated basic skills (reading; mathematics; problem solving) completely into the technical training program. Prototype materials were developed that followed the principles of the functional context method that Shoemaker (1960) and others had originated in the Army. The materials and methods were tried out at a community college, and the results indicated that the approach was feasible.

Functional Context Education Workshops. Based on the work to develop the functional context electronics technicians course, the Ford Foundation sponsored the development of a workshop on Functional Context Education that was conducted by Sticht at major universities and government offices in the United States. Over 400 adult educators, policymakers, and curriculum development professionals attended the workshops. A portion of the workshop was included in a nationally

broadcast program by WQED of Pittsburgh in a Public Broadcast System program called A Job to be Done.

Based on these workshops, several large-scale projects were subsequently started by various participants aimed at developing functional context, job-oriented literacy programs. Additionally, the Center for Advanced Learning Systems (CALS) in the U.S. Department of Labor prepared a paper for the International Labour Office that was distributed by that office. The paper was authored by David Barbee (1986) and was developed largely on the military work and Ford Foundation project to integrate electronics technicians training and basic skills training.

Technology Transfer in the Job Skills Education Program (JSEP). Branson (in press) has documented a joint project by the U.S. Departments of Labor, Defense, and Education to adapt the JSEP computer-based job-related basic skills instruction system to civilian contexts. Under a $628,000 contract from the U.S. Department of Education, the Center for Educational Technology at Florida State University, where the JSEP was originally developed for the Army, will adapt the JSEP for use in several states, including New York, Indiana, California and Delaware.

As Branson notes (in press, p. 34), even though there is the Stevenson-Wydler Technology Innovation Act of 1980 that advocates technology transfer from government to civilian users, technology transfer projects such as the JSEP are heavily dependent upon individuals to take the initiative in getting projects started. In the case of the JSEP technology transfer project, Sticht briefed Karl

Haigler, who was the Director of The Adult Literacy Initiative in the U.S. Department of Education, on the military's functional literacy activities, including the JSEP project. Based on this information, Haigler then initiated the actions that eventually culminated in the JSEP technology transfer project.

The McGraw-Hill Functional Context Basic Skills Project.

In early 1988, representatives of the Gregg Division of the McGraw-Hill Publishing Company contacted Sticht regarding the feasibility of developing vocationally-oriented basic skills (reading; mathematics) education materials for civilian schools.

Following a year of planning, with national market surveys, attendance at conferences, meetings with high level policymakers, and state and local education officials, it was determined that McGraw-Hill could provide a useful line of curriculum products to improve youth and adult basic skills by following the functional context approach developed in the military.

During the planning year, Apple Computer Corporation learned of the project and joined in a consortium with McGraw-Hill to provide computer support for the proposed project.

In late 1988 a major project was approved by McGraw-Hill management that would involve expenditures in excess of $3,000,000 to develop, publish, and distribute a new **Functional Context Basic Skills** series. In early 1989 a writing team was assembled and work was begun to develop book- and computer-based materials for integrating basic skills instruction with vocational instruction in the fields of Allied Health,

Automated Office, Automotive Maintenance, Business, Construction Trades, and Electronics Technician.

Implications for Human Resources Development Policy and Practice

The results of the military's experience with lower ability, less literate personnel suggests several directions for human resources development policy and practice.

Finding Opportunities for Earning and Learning

The military experience suggests that many youth and adults who are rejected from gainful employment may, in fact, be able to learn and perform jobs better than expected. Policies are needed that find opportunities for youth and young adults with lower academic skills in meaningful work within socially recognized and respected career fields that feature additional opportunities for training and education for career development.

Policies that prescribe education and training prior to admittance into jobs cannot build on the positive factors of identification with an occupation and social cohesion among workers. Greater attention should be given to policies that identify cognitive skills demands of jobs and cognitive abilities of youth and adults and develop methods for bringing people and jobs with matching cognitive levels together.

This may involve developing better methods for identifying the cognitive demands of work, better methods for matching youth and adults to work for which they are qualified, and better designed programs of training and education for employed persons.

In general, the military experience suggests that, when given an opportunity to succeed in a meaningful work setting, perhaps in a form of National Service Corps, that matches their abilities, provides well designed training, and offers social support many, indeed, most youth and adults cast off from employment can succeed.

Functional Context Education

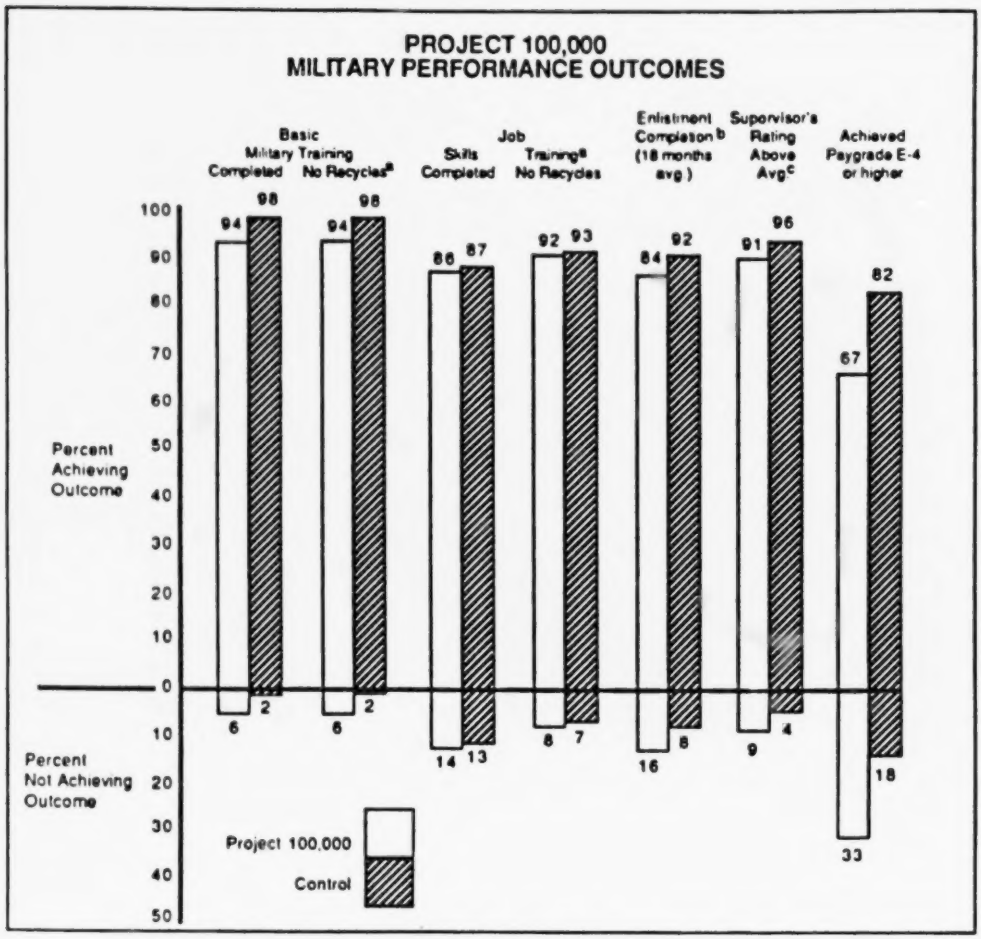
Research within the military demonstrates that many training and education programs are poorly designed, particularly with respect to lower ability youth and adults. In particular, programs that offer basic skills training in programs prior to and separate from vocational programs are not particularly effective in improving either basic skills nor vocational knowledge.

Policies are needed that direct practice in vocational and academic education away from the decontextualized programs that are typical of those in place, and that develop new approaches to education and training in secondary schools and second chance programs that follow the principles of functional context training and education developed by the military.

Technology Transfer

Ongoing projects reviewed in this paper show that technology transfer projects can be encouraged on the part of both private and public organizations that can help improve the functional nature of education and training for in-school and out-of-school youth and adults. Policies are needed that encourage the better synthesis of research findings and promote the transfer of technology from the military (and

other government agencies) to the civilian world, with an emphasis upon finding investment opportunities within the private sector.



[a] Control data for Army only. Project 100,000 data for all DoD.
[b] Completion of 13-24 months of service with 18 months average service completed.
[c] Ratings averaged across all four services. Slightly underestimated rates for Army and Air Force 1-5% and overestimated Nay and Marine Corps 1-5%.
Source: Office of the Asst. Sec. Defense (Manpower), 1971; Ramsberger & Means, 1987.

Figure 1. Summary of training and job performance of Project 100,000 personnel.

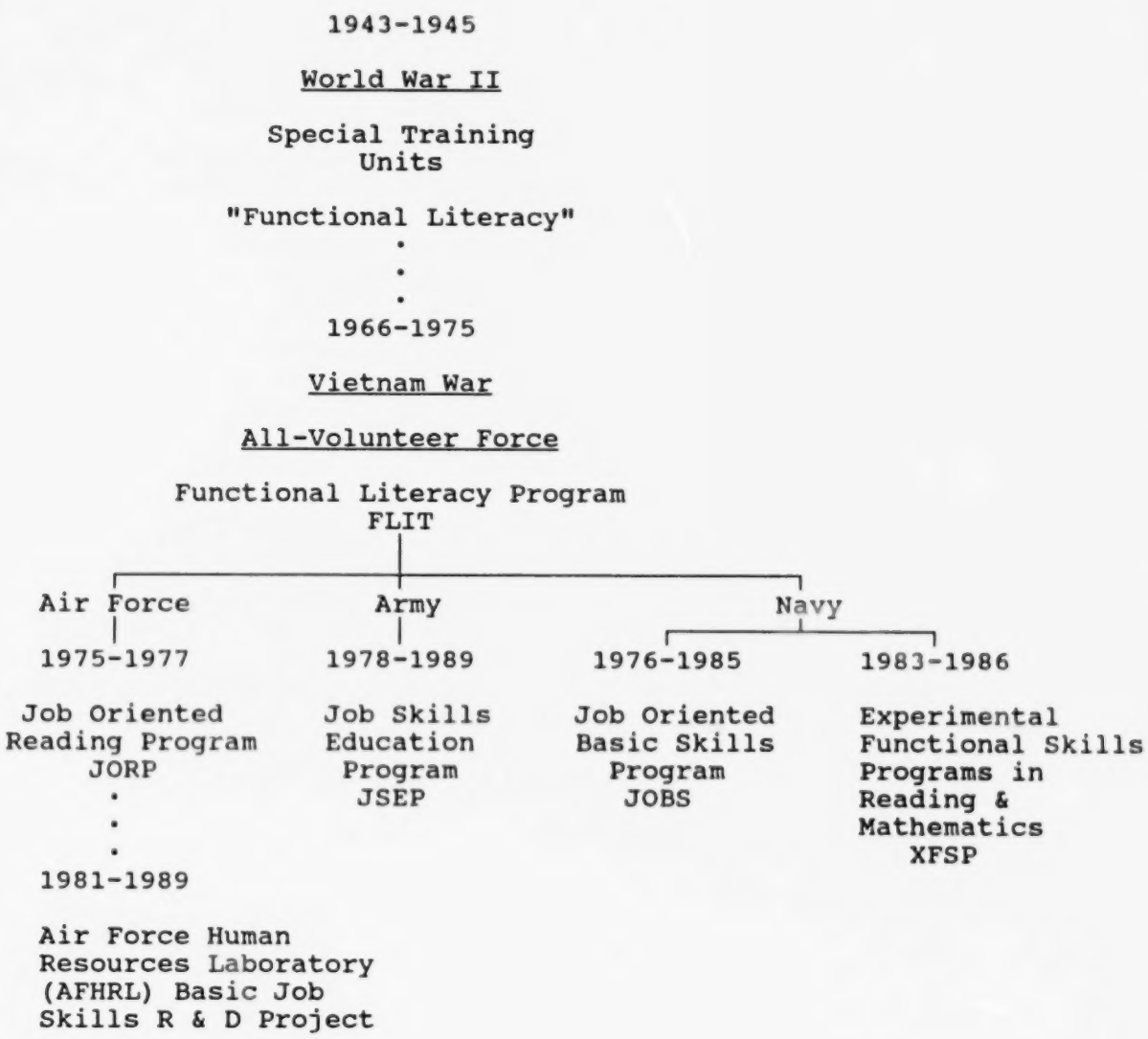


Figure 2

Functional context literacy programs since World War II showing influence of the Functional Literacy (FLIT) project on past and ongoing military basic skills projects. The AFHRL project of 1981 through 1989 is a major shift from traditional literacy programs to complex analytical and problem solving skills needed to work with high tech equipment. However, it was originally stimulated by the FLIT/JORP work and is included to illustrate how projects interact and develop.

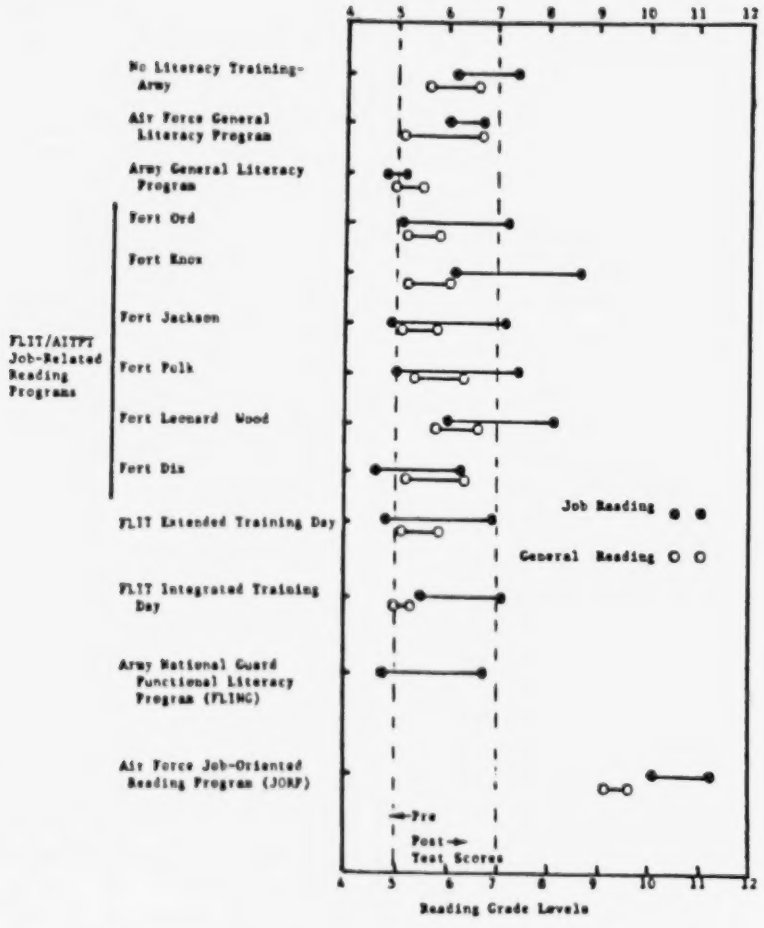


Figure 3

Data showing scores on pre- and post-job reading task tests and general literacy tests for different sites and FLIT training conditions.

Table 1

Army Performance of PI's and Non-PI's
and High School Graduation Status

		Mental Category					
		I	II	IIIA	IIIB	IV	PI
First Term Attrition							
	HSG%[a]	25	24	26	29	27	29
	NHSG%	35	47	51	53	—	54
Achieved E 4+							
	HSG%	94	91	89	86	86	84
	NHSG%	81	79	76	73	—	72
Attrition in Skill Training							
	HSG%	5	5	6	6	7	6
	NHSG%	10	8	8	10	—	9
SQT Score							
	HSG%	80	73	68	63	59	59
	NHSG%	78	72	67	64	—	63
Percent Passing SQT							
	HSG%	90	81	71	61	50	51
	NHSG%	85	80	69	61	—	61
First-Term Retention							
	HSG%	24	25	26	30	34	33
	NHSG%	24	19	20	20	—	20

[a] HSG = High School Graduate; NHSG = Non High School Graduate
Source: Greenberg, (1980)

Table 2

Military Research Projects Illustrating the Application of Functional Context Training Projects

Project (authors)	Period	Service	Features	Outcomes		
				Reduce Training Attrition	Reduce Training Time	Improve Achievement
BE/E (Johnson)	1949	Navy	Teach basic electricity/ electronics	yes	yes	yes
LIMIT (Goffard,	1954-1960	Army	Teach BE/E for Field Radio course	---	---	yes
REPAIR (Brown, et al)	1955-1960	Army	First formal statement of functional context method	---	---	yes
X-ET (Pickering & Anderson)	1964-1966	Navy	Teach BE/E to low aptitude sailors	---	yes	yes
SUPPORT (Ward, et al)	1967-1970	Army	Redesign medical corpsman course	---	fixed	yes
SUPPORT (Goffard, et al)	1967-1970	Army	Redesign radio operator's course	yes	yes	yes
APSTRAT (Weingarten, et al)	1968-1972	Army	Introduced peer instruction; mastery learning	yes	yes	yes

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